

WHAT IS CLAIMED IS:

1 1. A method for manufacturing an isolation trench in a
2 semiconductor device, said method comprising the steps of:
3 providing a substrate for said semiconductor device;
4 etching a trench in said substrate;
5 growing a silicon dioxide liner in said trench;
6 filling said trench with polysilicon material; and
7 depositing polysilicon material on top of said filled trench
8 to protect said silicon dioxide liner.

1 2. The method as set forth in Claim 1 wherein said step of
2 depositing polysilicon material on top of said filled trench to
3 protect said silicon dioxide liner comprises the step of:
4 forming said polysilicon material that is placed on top of
5 said filled trench with portions that extend laterally over an
6 edge of said filled trench.

1 3. The method as set forth in Claim 1 wherein said step of
2 growing a silicon dioxide liner in said trench further comprises
3 the step of:
4 growing said silicon dioxide liner on horizontal portions of
5 said substrate that are adjacent to an edge of said filled trench.

1 4. The method as set forth in Claim 3 wherein said step of
2 depositing polysilicon material on top of said filled trench to
3 protect said silicon dioxide liner comprises the step of:

4 forming said polysilicon material that is placed on top of
5 said filled trench with portions that extend laterally over said
6 horizontal portions of said substrate at an edge of said filled
7 trench that is covered with silicon dioxide liner.

1 5. The method as set forth in Claim 4 further comprising the
2 step of:

3 placing a layer of oxidation material over said polysilicon
4 material that is placed on top of said filled trench during a
5 subsequent oxidation process.

1 6. The method as set forth in Claim 1 further comprising
2 the step of:

3 selecting an initial height of said polysilicon material that
4 is deposited on top of said filled trench that is sufficient
5 for said polysilicon material to survive one of: at least
6 one subsequent etch procedure and at least one subsequent
7 oxidation procedure.

1 7. A method for manufacturing an isolation trench in a
2 semiconductor device, said method comprising the steps of:

3 providing a monocrystalline silicon substrate layer for said
4 semiconductor device;

5 applying a silicon dioxide layer over said monocrystalline
6 silicon substrate layer;

7 applying a layer of photoresist over said silicon dioxide
8 layer;

9 exposing and developing said photoresist from a trench area;

10 etching portions of said silicon dioxide layer in said trench
11 area;

12 removing said photoresist;

13 etching a trench in said trench area of said monocrystalline
14 silicon substrate layer;

15 etching portions of said silicon dioxide layer to pull back
16 said silicon dioxide layer from an edge of said trench;

17 growing a silicon dioxide liner in said trench;

18 filling said trench with polysilicon material; and

19 depositing polysilicon material on top of said filled trench
20 to protect said silicon dioxide liner.

1 8. The method as set forth in Claim 7 wherein said step of
2 depositing polysilicon material on top of said filled trench to
3 protect said silicon dioxide liner comprises the step of:

4 forming said polysilicon material that is placed on top of
5 said filled trench with portions that extend laterally over an
6 edge of said filled trench.

1 9. The method as set forth in Claim 7 wherein said step of
2 growing a silicon dioxide liner in said trench further comprises
3 the step of:

4 growing said silicon dioxide liner on horizontal portions of
5 said substrate that are adjacent to an edge of said filled trench.

1 10. The method as set forth in Claim 9 wherein said step of
2 depositing polysilicon material on top of said filled trench to
3 protect said silicon dioxide liner comprises the step of:

4 forming said polysilicon material that is placed on top of
5 said filled trench with portions that extend laterally over said
6 horizontal portions of said substrate at an edge of said filled
7 trench that is covered with silicon dioxide liner.

1 11. The method as set forth in Claim 10 further comprising
2 the step of:

3 placing a layer of oxidation material over said polysilicon
4 material that is placed on top of said filled trench during a
5 subsequent oxidation process.

1 12. The method as set forth in Claim 7 further comprising
2 the step of:

3 selecting an initial height of said polysilicon material that
4 is deposited on top of said filled trench that is sufficient
5 for said polysilicon material to survive one of: at least
6 one subsequent etch procedure and at least one subsequent
7 oxidation procedure.

1 13. An isolation trench for use in a semiconductor device
2 comprising:

3 a substrate of said semiconductor device;
4 a trench etched in said substrate;
5 a silicon dioxide liner grown in said trench;
6 polysilicon material filling said trench; and
7 polysilicon material deposited on top of said filled trench to
8 protect said silicon dioxide liner.

1 14. The isolation trench as set forth in Claim 13 wherein
2 said polysilicon material that is deposited on top of said filled
3 trench to protect said silicon dioxide liner comprises:

4 a portion of said polysilicon material that extends laterally
5 over an edge of said filled trench.

1 15. The isolation trench as set forth in Claim 13 further
2 comprising silicon dioxide liner grown on horizontal portions of
3 said substrate that are adjacent to an edge of said filled trench.

1 16. The isolation trench as set forth in Claim 15 wherein
2 said polysilicon material that is deposited on top of said filled
3 trench to protect said silicon dioxide liner comprises:

4 a portion of polysilicon material that extends laterally over
5 said horizontal portions of said substrate at an edge of said

6 filled trench that is covered with silicon dioxide liner.

1 17. The isolation trench as set forth in Claim 16 further
2 comprising a layer of oxidation material placed over said
3 polysilicon material that is placed on top of said filled trench.

1 18. The isolation trench as set forth in Claim 13 wherein
2 said polysilicon material that is deposited on top of said filled
3 trench has an initial height that is sufficient for said
4 polysilicon material to survive one of: at least one subsequent
5 etch procedure and at least one subsequent oxidation procedure.

1 19. The isolation trench as set forth in Claim 13 wherein
2 said polysilicon material that is deposited on top of said filled
3 trench is capable of expanding vertically and laterally.

1 20. The isolation trench as set forth in Claim 13 wherein
2 said polysilicon material that is deposited on top of said filled
3 trench does not create stress in said substrate.